## What is claimed is:

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- 1. A refractive index coupling distributed feedback semiconductor laser comprising a phase-shift structure, wherein when viewed from an almost central portion in a light distributed feedback direction in a region in which diffraction gratings are formed, an average coupling coefficient  $\kappa 2$  of a diffraction grating on one end face side is smaller than an average coupling coefficient  $\kappa 1$  of a diffraction grating on other end face side, and the coupling coefficient  $\kappa 2$  exceeds 100 cm<sup>-1</sup>.
- 2. A complex coupling distributed feedback semiconductor laser of a complex coupling type in which an absolute value of a real part of a coupling coefficient is four or more times an absolute value of an imaginary part of the coupling coefficient, comprising a phase-shift structure, wherein when viewed from an almost central portion in a light distributed feedback direction in a region in which diffraction gratings are formed, an average coupling coefficient  $\kappa 2$  of a diffraction grating on one end face side is smaller than an average coupling coefficient  $\kappa 1$  of a diffraction grating on other end face side, and the coupling coefficient  $\kappa 2$  exceeds 100 cm<sup>-1</sup>.
- 3. A distributed feedback semiconductor laser according to claim 1, wherein a plurality of phase-shift structures is formed at almost symmetrical positions about a central portion in a light distributed feedback direction in a region in which diffraction gratings are formed.
- 4. A distributed feedback semiconductor laser according to claim 1, wherein a phase-shift structure is formed at an almost central portion in a light distributed feedback direction in a region in which diffraction gratings are formed.

- 5. A distributed feedback semiconductor laser according to claim 1, wherein when a cycle of a diffraction grating is represented by  $\Lambda$ , a sum of phase-shift amounts given by all the phase-shift structures is almost N/2.
- 6. A distributed feedback semiconductor laser according to claim 1, wherein when a cycle structure of the diffraction grating is viewed in a light distributed feedback direction, a value of (duty of a high refractive index portion)/(duty of a low refractive index portion) in a region of the coupling coefficient ×1 is set to be larger than a value in a region of the coupling coefficient ×2.

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- 7. A distributed feedback semiconductor laser according to claim 1, wherein in a layer structure having a high refractive index of in the diffraction grating, the number of high refractive index layers of the coupling coefficient k1 is set to be larger than the number of high refractive index layers of the coupling coefficient k2.
  - 8. A distributed feedback semiconductor laser according to claim 1, wherein the thickness of a layer of a low refractive index existing between a layer of a high refractive index in the diffraction grating and the active layer is set to be smaller in the region of the coupling coefficient  $\kappa 1$  than in the region of the coupling coefficient  $\kappa 2$ .
- 9. A distributed feedback semiconductor laser according to claim 1, wherein when an equivalent refractive index acting when light is propagated through the region of the coupling coefficient  $\kappa 2$  is represented by n2, an equivalent refractive index acting when light is propagated through the region of the coupling coefficient  $\kappa 1$  is represented by n1, an average cycle of the diffraction grating in the region of the coupling coefficient  $\kappa 2$  is

represented by  $\Lambda 2$ , and an average cycle of the diffraction grating in the region of the coupling coefficient  $\kappa 1$  is represented by  $\Lambda 1$ ,  $n2 \cdot \Lambda 2$  is almost equal to  $n1 \cdot \Lambda 1$ .